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Institutional Barriers to Energy Transition in Brazilian Indigenous Territories:

A Critical Legal Perspective

Working Paper nº 06/2025

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Abstract

While SDG 7 promotes universal access to sustainable energy, national policies impose top-down solutions reinforcing power asymmetries rather than addressing historical injustices. In Brazil, many Indigenous communities remain excluded from clean energy despite state-led initiatives like “Luz para Todos” (Light for All). This contradiction—where environmental stewards rely on fossil fuels—reflects structural inequalities. Light for All, a federal program expanding electricity access, follows a rigid, state-centric framework with infrastructural constraints, limited community consultation, and misaligned technical solutions. In contrast, “Xingu Solar”, a third-sector initiative, prioritizes Indigenous agency through decentralized photovoltaic systems but remains structurally limited. Drawing from Critical Legal Studies, this article examines contrasting energy transition approaches, questioning the state-market dichotomy and how legal structures sustain or challenge inequalities. By critically analyzing these models, the research contributes to discussions on decolonial energy governance and just transitions.

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Institutional Barriers to Energy Transition in Brazilian Indigenous Territories: A Critical Legal Perspective

Dalila Martins Viol[1]

While SDG 7 promotes universal access to sustainable energy, national policies impose top-down solutions reinforcing power asymmetries rather than addressing historical injustices. In Brazil, many Indigenous communities remain excluded from clean energy despite state-led initiatives like "*Luz para Todos*" (*Light for All*). This contradiction—where environmental stewards rely on fossil fuels—reflects structural inequalities. *Light for All*, a federal program expanding electricity access, follows a rigid, state-centric framework with infrastructural constraints, limited community consultation, and misaligned technical solutions. In contrast, "*Xingu Solar*", a third-sector initiative, prioritizes Indigenous agency through decentralized photovoltaic systems but remains structurally limited. Drawing from Critical Legal Studies, this article examines contrasting energy transition approaches, questioning the state-market dichotomy and how legal structures sustain or challenge inequalities. By critically analyzing these models, the research contributes to discussions on decolonial energy governance and just transitions.

Keywords: SDG 7; Energy Justice; Indigenous Rights; Institutional Barriers; Critical Legal Studies.

1. Introduction

The United Nations' (UN) Sustainable Development Goal (SDG) 7 emphasizes universal access to affordable, clean energy as a core component of sustainable development.[2] However, in Brazil, more than one million people still lack access to

[1] PhD in Law and Development from the São Paulo School of Law at Fundação Getulio Vargas (FGV Law School, Brazil). I would like to express my sincere gratitude to the Instituto de Direito Global (IDGlobal)—a think tank where I have the privilege of serving as Executive Director—for fostering an intellectually vibrant and collaborative environment. I am particularly grateful for the opportunity to work alongside a diverse and committed team, including outstanding Indigenous researchers, whose perspectives and lived experiences have deeply enriched my understanding of the challenges and possibilities of advancing climate justice and just energy transitions in vulnerable communities.

[2] United Nations Development Programme. (n.d.). *Goal 7:* Affordable and clean energy. Retrieved November 4, 2024, from https://www.undp.org/sustainable-development-goals/affordable-and-clean-energy.

electricity in their homes.[3] An even higher number lacking access to clean energy, often relying on precarious systems powered by diesel and other fossil fuels.[4] A significant portion of those affected are traditional communities, including Indigenous peoples, who have historically faced structural vulnerability and marginalization.[5]

Indigenous territories play a crucial role in environmental preservation, both in Brazil and globally.[6] International organizations and scholars emphasize that Indigenous land rights make a significant contribution to forest conservation and carbon reduction,[7] having unparalleled potential for advancing both local energy sustainability and global climate goals. However, despite their widely acknowledged role as environmental stewards, many Indigenous communities—both in Brazil and worldwide—remain heavily reliant on diesel generators and other fossil fuels to meet their basic energy needs.[8] This fact is especially troubling, as Indigenous territories are highly vulnerable to the impacts of climate change due to their deep connection to nature and reliance on its

[3] Instituto de Energia e Meio Ambiente. (2020). *Quem ainda está sem acesso à energia elétrica no Brasil?* Retrieved November 4, 2024, from https://energiaeambiente.org.br/wp-content/uploads/2020/04/IEMA_quemestasemenergiaeletrica.pdf.

[4] Instituto de Energia e Meio Ambiente. (2019, January). *Xingu Solar:* Como a energia renovável pode beneficiar o Território Indígena do Xingu. Retrieved November 4, 2024, from https://energiaeambiente.org.br/wp-content/uploads/2019/01/relatorio_xingusolar_1.pdf.

[5] Only in the Legal Amazon, approximately 80,000 people from traditional communities, including Indigenous and *Quilombola* communities, lack access to electricity. (Instituto de Energia e Meio Ambiente. (2021, February). *Amazônia Legal*: Quem está sem energia elétrica. Retrieved November 4, 2024, from https://energiaeambiente.org.br/wp-content/uploads/2021/02/infografico-iema-amazonia.png.

[6] E..*g*., Fa, J. E., Watson, J., Leiper, I., & et al. (2020). Importance of Indigenous peoples' lands for the conservation of intact forest landscapes. *Frontiers in Ecology and the Environment*, 18(3), 135–140. https://doi.org/10.1002/fee.2148.

[7] See, *e.g.*, Qin, Y., Xiao, X., Liu, F., & et al. (2023). Forest conservation in Indigenous territories and protected areas in the Brazilian Amazon. *Nature Sustainability,* 6(3), 295–305; Veit, P., Gibbs, D., & Reytar, K. (2023, January). *Indigenous forests are some of the Amazon's last carbon sinks.* World Resources Institute. Retrieved November 4, 2024, from https://www.wri.org/insights/amazon-carbon-sink-indigenous-forests; Rights and Resources Initiative. (2018, September). *A global baseline of carbon storage in collective lands*. Retrieved November 4, 2024, from https://rightsandresources.org/wp-content/uploads/2018/09/A-Global-Baseline_RRI_Sept-2018.pdf.

[8] See, *e.g*., PEMBINA Institute. (2020). Diesel Reduction Progress in Remote Communities: Research summary. JSTOR. Retrieved from https://www.jstor.org/stable/resrep25466. During the 2025 edition of the Acampamento Terra Livre – ATL (Free Land Camp)—an annual national gathering of Indigenous peoples in Brazil to advocate for rights and territorial protection—Indigenous leaders called for a just energy transition and the phase-out of fossil fuels. This demand arises despite the ongoing reliance of many Indigenous communities on diesel generators to meet their basic energy needs. Rather than a contradiction, this highlights the urgent need for public policies that ensure equitable access to renewable and sustainable energy solutions in Indigenous territories. *See*, Um Só Planeta. (2025, April 10). ATL 2025: Líderes indígenas entregam carta à presidência da COP30 pedindo fim dos combustíveis fósseis e transição energética justa. *Globo*, 10 abr. 2025. Retrieved from https://umsoplaneta.globo.com/clima/noticia/2025/04/10/atl-2025-lideres-indigenas-entregam-carta-a-presidencia-da-cop30-pedindo-fim-dos-combustiveis-fosseis-e-transicao-energetica-justa.ghtml;

resources for their way of life.[9]

It is essential to understand that diesel use in these communities is not a matter of choice; its high-cost places a significant financial burden on communities already facing socioeconomic vulnerability. In this context, diesel remains the most practical option due to its ease of transport to isolated locations. This dependence on polluting fuels underscores a troubling paradox: communities that are essential to conservation and sustainability are compelled to use environmentally harmful energy sources, largely due to insufficient state policies that fail to ensure access to clean energy solutions. This situation is consistent with studies showing that institutional quality, income, health, and education significantly impact climate adaptation,[10] with Indigenous communities often lacking the necessary support for resilient development pathways.[11]

One Brazilian state initiative aimed at addressing this issue is the public policy program "*Luz para Todos"* (*Light for All*) launched by Decree No. 4,873 in 2003.[12] Designed as a tool for social development and inclusion, the program responded to findings from the 2000 census by the Brazilian Institute of Geography and Statistics (IBGE), which revealed that two million households—representing approximately ten million people—lacked access to electricity. [13] Nearly 90% of these households had a monthly income of less than three minimum wages, underscoring the correlation between energy exclusion and socioeconomic vulnerability.[14]

By 2009, the federal government reported that, under the *Light for All* program, two million electricity connections had been completed, benefiting approximately ten

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[9] *E.g*., Reyes-García, V., et al. (2024). Indigenous peoples and local communities report ongoing and widespread climate change impacts on local social-ecological systems. *Communications Earth & Environment,* 5(1). https://doi.org/10.1038/s43247-023-01164-y.

[10] See, *e.g*., Helm, A., & Parker, D. (2024*). Institutions and adaptation to climate change in developing countries*: A literature review (Ronald Coase Institute, Working Paper No. 10). https://www.coase.org/workingpapers/wp-10.pdf.

[11] *E.g*., Fayazi, M., Bisson, I.-A., & Nicholas, E. (2020). Barriers to climate change adaptation in indigenous communities: A case study on the Mohawk community of Kanesatake, Canada. International *Journal of Disaster Risk Reduction*, 49. https://www.sciencedirect.com/science/article/pii/S2212420920301503.

[12] Brasil. (2003, November 11). *Decreto nº 4.873.* Retrieved November 4, 2024, from https://www.planalto.gov.br/ccivil_03/decreto/2003/d4873.htm#:~:text=DECRETA%3A,acesso%20a%20esse%20servi%C3%A7o%20p%C3%BAblico.

[13] Ministério de Minas e Energia. (2024). *Programa Luz para todos.* Retrieved November 4, 2024, from https://www.gov.br/mme/pt-br/destaques/Programa%20Luz%20para%20Todos

[14] Ministério de Minas e Energia. (2024). *Programa Luz para todos.* Retrieved November 4, 2024, from https://www.gov.br/mme/pt-br/destaques/Programa%20Luz%20para%20Todos

million people.[15] During its initial implementation, the program prioritized communities that could be integrated into the existing electrical grid, within the reach of Brazil's "*Sistema Interligado Nacional* – SIN" (National Interconnected Electricity System).[16] This is likely one of the reasons why isolated communities have continued to lack access to electricity. In 2024, a study by the IBGE revealed that 3% of households in rural areas still lack access to electricity. In the rural areas of the Northern region—where there is a higher concentration of Indigenous populations—this figure rises to 4.4%, representing hundreds of thousands of people living without access to this basic service.[17]

In 2023, the *Light for All* program was restructured through Decree No. 11,628, with a renewed focus on expanding electricity access to rural populations that had not been reached by the program's initial implementation.[18] This version of the program is scheduled to remain in effect until December 31, 2026 for rural populations, and until December 31, 2028 for residents of remote areas within the Legal Amazon.[19] A notable feature of the updated policy is the incorporation of renewable energy sources and the recognition of their strategic role in preserving the Amazon biome. Solar energy, in particular, has emerged as a central pillar of this approach. While existing literature generally suggests that, historically, solar energy projects in these communities have met with minimal resistance or negative feedback,[20] this paper challenges that narrative by arguing that such implementations do, in fact, elicit significant community reactions—yet these responses have largely gone unheard or unacknowledged.

Third-sector initiatives, in dialogue with Indigenous communities, have been

[15] Ministério de Minas e Energia. (2009). *Light for All: A historic landmark – 10 million Brazilians out of the darkness*. Brasília: Ministry of Mines and Energy. Coordination by Lucia Mitico Seo and José Renato Esteves. https://www.gov.br/mme/pt-br/destaques/Programa%20Luz%20para%20Todos/publicacoes/livro-um-marco-historico-10-milhoes-de-brasileiros-sairam-da-escuridao/livro-um-marco-historico-10-milhoes-de-brasileiros-sairam-da-escuridao-ingles.pdf/@@download/file.

[16] Hochstetler, K. (2020). *Political economies of energy transition*: Wind and solar power in Brazil and South Africa. Cambridge University Press. https://doi.org/10.1017/9781108920353.

[17] Carneiro, L. (December 12, 2024) IBGE: Acesso à energia elétrica é quase universal no Brasil. *Valor Econômico*. Retrieved May 2, 2024, from https://valor.globo.com/brasil/noticia/2024/12/20/ibge-acesso-a-energia-eletrica-e-quase-universal-no-brasil.ghtml.

[18] Brasil. (2023, August 4). *Decreto nº 11.628.* Retrieved May 2, 2025, from https://www.planalto.gov.br/ccivil_03/_ato2023-2026/2023/decreto/d11628.htm.

[19] Secretaria de Comunicação Social. (2024, July 11). *Luz para Todos Program*. Retrieved May 2, 2025, from https://www.gov.br/secom/pt-br/acesso-a-informacao/comunicabr/lista-de-acoes-e-programas/programa-luz-para-todos.

[20] E.g., Hochstetler, K. (2020). *Political economies of energy transition*: Wind and solar power in Brazil and South Africa. Cambridge University Press. https://doi.org/10.1017/9781108920353.

mapping and identifying several critical shortcomings in the *Light for All* program.[21] These include the placement of solar panels in locations considered culturally or environmentally inappropriate by local communities, and the prioritization of residential energy access over more urgent community infrastructure needs—such as supplying electricity to health clinics and water pumping stations. Additional issues include the installation of systems with voltage levels incompatible with equipment readily available in nearby towns, the issuance of electricity bills in formats that are difficult for Indigenous communities to understand—resulting in payment difficulties—and inadequate support for the maintenance of solar energy systems. Another major concern is the lack of transparency and limited information-sharing by energy distributors responsible for administering subsidies under the *Light for All* program, in contradiction to the principles of the International Labour Organization (ILO) Convention No. 169 on Indigenous and Tribal Peoples, to which Brazil is a signatory.[22]

In parallel, non-governmental initiatives aimed at promoting a just energy transition in Indigenous territories—such as Xingu Solar, led by the Instituto Socioambiental (ISA)—have demonstrated more context-sensitive and effective approaches to expanding energy access.[23] Beyond the installation of photovoltaic systems, *Xingu Solar* was built upon four strategic pillars: the implementation of demonstrative reference systems in schools, health posts, and community centers; technical training for Indigenous residents to foster local capacity for system operation

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[21] E.g., Instituto de Defesa de Consumidores. (2024). *No escuro da floresta: Situação de exclusão energética na Amazônia Legal e lacunas nas políticas públicas de acesso à energia*. IDEC. https://idec.org.br/pdf/Idec_Relatorio-Exclusao-Energetica-nos-SISOL.pdf; Portugal Gouvêa, C., Viol, D. M., Teles Marques, A., Soares Araujo, J., da Silva, I., Gonçalves Barreira, L. G., & Monteiro de Oliveira, A. (2025). Relatório de Pesquisa – O Direito à Energia: Respostas da literatura e da jurisprudência às demandas de comunidades do Território Indígena Wawi (Research Report – The Right to Energy: Responses from Legal Scholarship and Case Law to the Demands of Communities in the Wawi Indigenous Territory). *Social Science Research Networ*k. Retrieved May 2, 2025, from https://papers.ssrn.com/abstract=5217191.

[22] International Labour Organization. (1989). *Indigenous and Tribal Peoples Convention, 1989 (No. 169)*. Retrieved May 2, 2025, from https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_INSTRUMENT_ID:312314.

[23] Instituto de Energia e Meio Ambiente (2019) *Avaliação de impacto socioambiental da introdução de sistemas fotovoltaicos no Território Indígena do Xingu.* Retrieved November 4, 2024, from https://site-antigo.socioambiental.org/sites/blog.socioambiental.org/files/nsa/arquivos/xingusolar_avaliacaosocioambiental.pdf; Instituto de Energia e Meio Ambiente. (2019); *Xingu Solar:* Como a energia renovável pode beneficiar o Território Indígena do Xingu. Retrieved November 4, 2024, from https://energiaeambiente.org.br/wp-content/uploads/2019/01/relatorio_xingusolar_1.pdf.

and maintenance; the development of community-based energy management practices; and the promotion of public policies that recognize the potential of decentralized solar systems to meet off-grid energy demands in a sustainable manner.[24] The project placed a strong emphasis on participatory planning, cultural respect, and long-term viability. Despite its success, systemic barriers continue to pose challenges for the broader replication and scaling of similar initiatives.[25]

Thus, there remains a persistent energy access gap that places many Brazilian Indigenous communities in a state of energy poverty—undermining fundamental rights such as access to healthcare, education, and clean water,[26] while reinforcing dependence on costly and polluting fuels like diesel. Furthermore, when electricity does reach these territories, it is often delivered through top-down approaches that fail to consider Indigenous cultural values, community priorities, and traditional knowledge systems.[27] More broadly, not only in Brazil, governmental programs intended to address the socio-environmental needs of Indigenous populations frequently lack meaningful consultation and participation. As a result, such interventions risk reproducing, rather than remedying, existing inequities.[28] Despite the severity of these challenges, the issue has been addressed primarily within the sphere of civil society advocacy, with limited engagement from academic scholarship to date.

This paper offers a critical analysis of energy transition processes in Indigenous territories in Brazil by contrasting two implementation models: the state-driven *Light for*

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[24] Instituto Socioambiental (ISA) & Instituto de Energia e Meio Ambiente (IEMA). (2019). *Aprendizados e desafios da inserção de tecnologia solar fotovoltaica no Território Indígena do Xingu*. São Paulo: Instituto Socioambiental & Instituto de Energia e Meio Ambiente. Retrieved May 2, 2025, from https://energiaeambiente.org.br/wp-content/uploads/2019/01/xingusolar_desafios.pdf.

[25] Instituto de Energia e Meio Ambiente. (2019). *Xingu Solar:* Como a energia renovável pode beneficiar o Território Indígena do Xingu. Retrieved November 4, 2024, from https://energiaeambiente.org.br/wp-content/uploads/2019/01/relatorio_xingusolar_1.pdf.

[26] Ruiz-Rivas, U., Tahri, Y., Arjona, M. M., Chinchilla, M., Castaño-Rosa, R., & Martínez-Crespo, J. (2022). Energy poverty in developing regions: Strategies, indicators, needs, and technological solutions. In C. Rubio-Bellido & J. Solis-Guzman (Eds.), *Energy poverty alleviation: New approaches and contexts* (pp. 17–39). Springer. https://doi.org/10.1007/978-3-030-91084-6_2

[27] E.g., Povos Xinguanos. (2025). *Carta dos povos Xinguanos sobre o Luz para Todos*. Energia e Comunidades. Disponível em https://www.energiaecomunidades.com.br/wp-content/uploads/2025/04/Carta_dos_povos_xinguanos_sobre_o_LpT.pdf.

[28] *E.g*., See, J., *et al.* (2024). From absences to emergences: Foregrounding traditional and Indigenous climate change adaptation knowledges and practices from Fiji, Vietnam, and the Philippines. *World Development,* 176. https://doi.org/10.1016/j.worlddev.2023.106503; Srinivasan, A. (2004). *Local knowledge for facilitating adaptation to climate change in Asia and the Pacific*: Policy implications (IGES-CP Working Paper). https://www.iges.or.jp/en/publication_documents/pub/discussionpaper/en/111/CP-04-019.pdf.

All program and third-sector initiatives such as *Xingu Solar*. Framed by the Critical Legal Studies (CLS) framework, the study interrogates how institutional and legal arrangements influence the distribution of energy infrastructure and the conditions under which access is extended. Particular attention is given to the implications of these models for Indigenous rights, cultural integrity, and ecological preservation. Rather than assuming the inherent benefits of renewable energy, this research problematizes its deployment in marginalized territories, highlighting how well-intentioned interventions can reproduce inequality when divorced from local realities and participatory governance.

By addressing a gap in the literature—specifically, the limited engagement with how energy transitions impact structurally vulnerable communities, particularly Indigenous ones—this article contributes to a more nuanced understanding of justice within sustainability transitions. Beyond Brazil, these findings contribute to global discussions on equitable energy governance, especially in light of disparities: approximately 685 million people worldwide remain without access to electricity.[29] Drawing from Brazil's case, the study provides critical insights into how socially inclusive and culturally responsive energy strategies might be developed for other underserved and Indigenous populations around the world.

Beyond this introduction, the paper is structured as follows. The next section outlines the analytical framework and methodological approach, drawing on CLS and incorporating insights from Critical Indigenous Studies and Global South epistemologies. The third section provides an analysis of the *Light for All* program, critically assessing its implementation in Indigenous territories. The fourth section examines the *Xingu Solar* as a third-sector alternative, evaluating both its achievements and structural limitations. The fifth section contrasts these two models through the lens of CLS, interrogating how legal and institutional frameworks shape access to energy and either reproduce or challenge entrenched hierarchies. The paper concludes by reflecting on the broader implications of these findings for energy governance in marginalized contexts and by outlining the

[29] International Energy Agency (IEA), International Renewable Energy Agency (IRENA), United Nations Statistics Division (UNSD), World Bank, & World Health Organization (WHO). (2024). *Tracking SDG7:* The energy progress report 2024. Washington, DC: World Bank. Retrieved May 2, 2025, from https://www.iea.org/reports/tracking-sdg7-the-energy-progress-report-2024

study's contributions to the field.

2. Analytical Framework and Methodological Approach

This study arises from a critical gap in the academic literature on how institutional and legal frameworks shape energy transitions in Indigenous territories. Recent studies, such as Parker et al., underscore this blind spot by demonstrating that even in contexts like the United States—where American Indian reservations hold substantial wind and solar potential—systemic barriers and regulatory complexity have led to dramatically lower rates of renewable energy deployment on Indigenous lands compared to adjacent non-reservation areas.[30] This disparity is not merely technical but reflects deeper issues of institutional exclusion, historical marginalization, and governance constraints. In Brazil, these concerns are even less explored in scholarly literature.[31]

To critically interrogate these issues, this research draws on the theoretical framework of CLS, which emerged in the 1970s as a radical critique of legal formalism, rejecting the notion of law as neutral or apolitical. Pioneering scholars such as Duncan Kennedy,[32] Roberto Mangabeira Unger,[33] and Mark Tushnet[34] argued that legal systems are embedded in and reproduce social hierarchies, including those related to race, class, and power. Horwitz further demonstrated how legal distinctions—such as the public/private divide—serve to legitimize economic and institutional inequality.[35] As Kennedy and Karl E. Klare noted, CLS is not defined by a single methodology but by a shared commitment to exposing how legal frameworks reinforce structures of

[30] Parker, D. P., Johnston, S., Leonard, B., Stewart, D., & Winikoff, J. B. (2024). *Economic potential of wind and solar in American Indian communities*. *Nature Energy, 9*. https://doi.org/10.1038/s41560-024-01617-4.
[31] Botão, R. P., Portugal Gouvêa, C., Viol, D. M., & Mendes, M. dos S. (2025). *Leveraging carbon offsets: A multidisciplinary analysis of climate action in Brazilian Indigenous territories* [Working paper]. 20th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES), Brazil.
[32] Kennedy, D. (1981). Critical Labor Law Theory: A Comment. *Industrial Relations Law Journal*, 4(3). https://core.ac.uk/download/pdf/28950728.pdf.
[33] Unger, R. M. (1983). The Critical Legal Studies Movement. *Harvard Law Review*, 96(3), 561–675. https://doi.org/10.2307/1341032.
[34] Tushnet, M. (1986). Critical Legal Studies: An Introduction to its Origins and Underpinnings. *Journal of Legal Education*, 36(4), 505–517. https://eric.ed.gov/?id=EJ351022.
[35] Horwitz, M. J. (1982). The History of the Public/Private Distinction. *University of Pennsylvania Law Review*, 130(6), 1423–1428. https://doi.org/10.2307/3311976.

domination.[36] More recently, Samuel Moyn has called for a revival of CLS as a tool for analyzing how law simultaneously functions as a site of both repression and contestation, particularly in light of emerging movements such as Law and Political Economy and Critical Race Theory.[37]

CLS provides an appropriate lens for this study because it allows for a critical examination of how state and third-sector energy policies operate within systems of power that often marginalize Indigenous voices. This framework helps problematize the assumption that legal and policy instruments, particularly those promoting renewable energy, are inherently emancipatory. Instead, it highlights the importance of examining who designs these systems, who benefits, and who is excluded.

In connection with CLS, this study also engages with the emerging and gradually expanding field of Critical Indigenous Studies. As articulated in The Routledge Handbook of Critical Indigenous Studies, this field centers Indigenous knowledge, sovereignty, and lived experience as foundational to research and theory-building—resisting colonial epistemologies and advancing Indigenous academic autonomy.[38] The emergence of networks such as the Native American and Indigenous Studies Association (NAISA) has fostered an international community of Indigenous scholars who produce interdisciplinary, critical work grounded in Indigenous worldviews. Despite this intellectual flourishing, institutional barriers—including limited funding and recognition—continue to hinder the full development of Indigenous Studies.[39]

Moreover, this study adopts a Global South perspective, addressing a significant gap in the literature regarding how institutional structures shape climate adaptation and energy transitions in developing contexts. While existing research has documented how policies in developed countries can hinder efficient adaptation and increase costs, there

[36] Kennedy, D., & Klare, K. E. (1984). A Bibliography of Critical Legal Studies. *The Yale Law Journal*, 94(2), 461–490. https://www.jstor.org/stable/796234.
[37] Moyn, S. (2024). Reconstructing Critical Legal Studies. *Yale Law Journal*, 134(1), 77-122. https://www.yalelawjournal.org/essay/reconstructing-critical-legal-studies.
[38] Hokowhitu, B. (2020). Introduction. In B. Hokowhitu, A. Moreton-Robinson, L. Tuhiwai Smith, C. Andersen, & S. Larkin (Eds.), *Routledge handbook of critical Indigenous studies*. Routledge. https://doi.org/10.4324/9780429440229.
[39] Andersen, C. (2020). Disciplinary knowledge and epistemology. In B. Hokowhitu, A. Moreton-Robinson, L. Tuhiwai Smith, C. Andersen, & S. Larkin (Eds.), *Routledge handbook of critical Indigenous studies*. Routledge. https://doi.org/10.4324/9780429440229

remains limited analysis of how these challenges manifest in developing countries.[40] In general, institutions in the Global South are often insufficiently studied, as they are generally viewed as either (i) replicating Global North strategies at the local level;[41] or (ii) less relevant compared to Euro-American legal frameworks.[42] However, the unique institutional contexts of Global South countries demand specific, context-sensitive research.[43] The knowledge produced by Global South scholars is especially valuable in climate adaptation studies, as the impacts of climate change are felt globally but disproportionately affect developing countries.[44] Research led by scholars from the Global South offers critical insights into adaptation strategies tailored to these unique challenges, providing context-specific solutions and perspectives. Such contributions are essential to building a more inclusive and comprehensive understanding of global climate resilience, ensuring that adaptation efforts truly address the needs of those most affected.

Thus, this paper also aligns with the decolonial energy governance agenda by emphasizing how institutional and legal structures shape energy transitions in ways that reproduce colonial hierarchies, marginalize Indigenous epistemologies, and restrict community agency. As Basu affirms, energy systems in the Global South remain embedded in colonial infrastructures and institutional logics that continue to exclude Indigenous knowledge and reinforce externally imposed models of development.[45] Wilkens and Datchoua-Tirvaudey similarly argue that dominant climate governance frameworks reinforce epistemological hierarchies by prioritizing Western conceptions of justice and sidelining the perspectives of Indigenous and marginalized communities.[46]

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[40] Helm, A., & Parker, D. (2024*). Institutions and adaptation to climate change in developing countrie*s: A literature review (Working Paper No. 10). University of Wisconsin–Madison. https://www.coase.org/workingpapers/wp-10.pdf.

[41]Maldonado, D. B. (2021). *Legal barbarians: Identity, modern comparative law and the global South*. Cambridge University Press. https://doi.org/10.1017/9781108985888

[42] Esquirol, J. L. (2020). *Ruling the law: Legitimacy and failure in Latin American legal systems*. Cambridge University Press. https://doi.org/10.1017/9781316823552

[43] Viol, D. M. (2024). The Rise of Corporate Compliance Programs as a Public Strategy Against Corruption: Mapping the Spread of Legal Reforms in Latin America. In: Odilla, F., Tsimonis, K. (eds.) *Corruption and Anti-Corruption Upside Down. Political Corruption and Governance*. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-66032-0_14.

[44] Ngcamu, B. S. (2023). Climate change effects on vulnerable populations in the Global South: A systematic review. *Natural Hazards*, 118, 977–991. https://doi.org/10.1007/s11069-023-06070-2.

[45] Basu, S. (n.d.). Decolonising energy: Enabling just transitions. *The University of Warwick*. https://warwick.ac.uk/fac/soc/pais/prospectivestudents/outreach/colonialhangover/magazine/archive/decolonisingenergy.

[46] Wilkens, J., & Datchoua-Tirvaudey, A. R. C. (2022). Researching climate justice: A decolonial approach to global climate governance. *International Affairs*, 98(1), 125–143. https://doi.org/10.1093/ia/iiab209.

Tornel furthers this critique by proposing a decolonial approach to energy justice grounded in relational ontologies and place-based practices, emphasizing the need to recognize the unsustainability embedded in prevailing energy regimes.[47]

Therefore, this study adopts a qualitative, interdisciplinary, and critical methodology that draws from CLS in connection whit other epistemologies. Through comparative analysis of state-led and third-sector energy initiatives in Indigenous territories—anchored in document analysis, and scholarly and policy literature—it seeks to expose the institutional dynamics that shape access to clean energy. By doing so, it contributes to a more nuanced and just understanding of the energy transition in marginalized contexts.

3. Light for All?

The *Light for All* program launched by the Brazilian Federal Government in 2003, aimed to achieve universal access to electricity across rural and remote regions of the country.[48] Funded through a combination of public resources, private contributions, and investments from electricity distributors, the program was conceived as a key tool for promoting social inclusion, fostering economic development, and improving health, education, food security, and overall quality of life.[49] Recent legislation—most notably Decree No. 11.628/2023, which updates the program—affirms the prioritization of electricity provision for Indigenous peoples and low-income households.[50] It also emphasizes the integration of renewable energy sources and the importance of aligning energy access initiatives with local environmental and cultural contexts. In theory, the program is expected to be responsive to the specific needs and rights of each community. However, the implementation of *Light for All* in Indigenous territories—such as on the

[47] Tornel, C. (2023). Decolonizing energy justice from the ground up: Political ecology, ontology, and energy landscapes. *Progress in Human Geography, 47*(1), 43–65. https://doi.org/10.1177/03091325221132561.
[48] Brasil. (2023, August 4). *Decreto nº 11.628.* Retrieved May 2, 2025, from https://www.planalto.gov.br/ccivil_03/_ato2023-2026/2023/decreto/d11628.htm.
[49] NAE. (n.d.). *NAE Case Study: Brazil, Luz para Todos (Light for All)*. Energypedia. Retrieved April 16, 2025, from https://energypedia.info/wiki/NAE_Case_Study:_Brazil,_Luz_para_Todos_%28Light_for_All%29.
[50] Brasil. (2023, August 4). *Decreto nº 11.628.* Retrieved May 2, 2025, from https://www.planalto.gov.br/ccivil_03/_ato2023-2026/2023/decreto/d11628.htm.

Xingu Indigenous Territory, located in the Central-West of Brazil, the first Indigenous land officially demarcated in the country[51]—reveals a stark mismatch between policy intentions and lived realities.

A recent research report from the non-governmental organization, IDGlobal, on the energy transition in the Xingu Indigenous Territory highlights one of the most pressing technical challenges: the installation of low-capacity photovoltaic systems (110V), which are inadequate to meet the basic energy needs of Indigenous families.[52] This is particularly problematic given that most electronic equipment available for purchase in nearby cities operates on a 220V standard, as does the SIN in those regions. This report also highlights hazardous conditions, including exposed wiring and makeshift connections, all of which pose serious safety risks and threaten the sustainability of the installed infrastructure and the well-being of community members.

The IDGlobal report also highlights that Indigenous families have been subjected to opaque billing practices that fail to account for their cultural and linguistic backgrounds, offering little to no explanation of energy consumption charges and providing limited access to appropriate support channels. Many have accumulated significant debts without understanding how they arose, leading to credit blacklisting. This situation reflects not only an administrative challenge but also practices that are misaligned with the regulatory protections afforded by Brazilian law. According to the "*Código de Defesa do Consumidor*" (Consumer Protection Code) and regulatory standards governing electricity concessionaires, consumers are guaranteed rights to transparency, clarity of information, and the safety of electrical installations—standards

[51] Nunes, M. (2022, November). Xingu: A história dos povos do primeiro território demarcado no Brasil em imagens produzidas por indígenas e não-indígenas. *Conexão Planeta.* Retrieved April 16, 2025, from https://conexaoplaneta.com.br/blog/xingu-a-historia-dos-povos-do-primeiro-territorio-demarcado-no-brasil-em-imagens-produzidas-por-indigenas-e-nao-indigenas/.

[52] Portugal Gouvêa, C., Viol, D. M., Teles Marques, A., Soares Araujo, J., da Silva, I., Gonçalves Barreira, L. G., & Monteiro de Oliveira, A. (2025). Relatório de Pesquisa – O Direito à Energia: Respostas da literatura e da jurisprudência às demandas de comunidades do Território Indígena Wawi (Research Report – The Right to Energy: Responses from Legal Scholarship and Case Law to the Demands of Communities in the Wawi Indigenous Territory). *Social Science Research Network.* Retrieved May 2, 2025, from https://papers.ssrn.com/abstract=5217191https://papers.ssrn.com/abstract=5217191

that have been systematically violated in these contexts.[53]

Other non-governmental organizations have been bringing attention to the problems faced by Indigenous peoples in the context of the *Light for All* program, particularly those involving violations of consumer rights. The "*Instituto de Defesa de Consumidores* —IDEC" (Institute for Consumer Protection), in a 2024 report, revealed that Indigenous and traditional communities in the Amazon Legal region continue to face deep structural barriers to accessing electricity, even after being formally included in the program.[54] The report documents that, in many cases, families wait years for the installation of solar kits, despite having completed all required procedures. Even when systems are installed, they often break down and remain without maintenance for months, leaving households without electricity and increasing their dependence on expensive and polluting diesel generators. Communities also face severe communication challenges with electricity distributors due to the lack of internet or telephone access, preventing them from requesting technical assistance or reporting outages. Furthermore, there is no local technical support, and the residents are not trained to maintain the systems. IDEC points out that these conditions amount to a violation of consumer rights, especially in terms of the continuity, adequacy, and quality of essential public services guaranteed by Brazilian law.

Moreover, the IDGlobal report shows that energy installations under the *Light for All* also violated fundamental rights by disregarding the obligation to conduct free, prior, and informed consultation, as mandated by ILO Convention No. 169 and Brazilian constitutional law. In numerous cases, electricity installations were implemented without meaningful dialogue or adequate information-sharing, thereby ignoring the collective decision-making processes of Indigenous people. In the case of Xingu, a consultation was conducted online during the COVID-19 pandemic. However, due to limited internet access and the inaccessibility of the information shared, the process was insufficient to be considered broad or properly informed. It amounted to little more than a formal

[53] Brasil. (1990). *Lei nº 8.078, de 11 de setembro de 1990*. Retrieved May 5, 2025, from https://www.planalto.gov.br/ccivil_03/leis/l8078compilado.htm. Agência Nacional de Energia Elétrica. (2021). *Resolução Normativa nº 1.000, de 7 de dezembro de 2021.* Retrieved May 5, 2025, from https://www2.aneel.gov.br/cedoc/ren20211000.html.

[54] Instituto de Defesa de Consumidores. (2024). *No escuro da floresta*: Situação de exclusão energética na Amazônia Legal e lacunas nas políticas públicas de acesso à energia. IDEC. https://idec.org.br/pdf/Idec_Relatorio-Exclusao-Energetica-nos-SISOL.pdf.

exercise devoid of substantive engagement with the community. This absence of genuine consultation goes beyond mere procedural shortcomings—it constitutes a direct infringement on Indigenous autonomy and self-determination.

In addition to the lack of meaningful consultation, communities have also voiced concern over how implementation decisions have failed to reflect their spatial and cultural priorities. In the Xingu Territory residents reported that the placement of photovoltaic systems often disregarded local planning preferences. Instead of sitting in communal spaces—such as schools and health posts—where they could serve collective needs, the concessionaire prioritizes installing them on individual household structures. This approach not only limited broader community use of the energy supply but also disrupted important aspects of daily life. Moreover, panels were frequently installed in domestic outdoor areas traditionally used for leisure, social gatherings, and small-scale cultivation, restricting both subsistence activities and spaces essential to cultural and intergenerational interaction. These outcomes illustrate a broader pattern of imposed technical solutions that overlook Indigenous territorial use and collective organization.

The persistent challenges faced by Indigenous communities under the *Light for All* program have sparked a coordinated mobilization for change. In April 2025, the "*Rede Energia e Comunidades*" (Energy and Communities Network)—a coalition of civil society organizations, researchers, and Indigenous associations—organized a landmark event in the Xingu region to address the program's shortcomings in effectively serving Indigenous territories.[55] The gathering brought together government officials, representatives from energy concessionaires, local Indigenous leaders, and technical experts to assess the impacts of current energy policies and to propose more just, culturally appropriate, and sustainable energy solutions for the Xingu Territory.

The meeting resulted in the publication of two key documents. The first, the "*Carta dos Povos Xinguanos sobre o Programa Luz para Todos*" (Xingu Peoples' Letter on the Light for All Program), is a unified statement from Indigenous communities in the Xingu denouncing the program's systemic shortcomings.[56] It details problems such as the

[55] Rede Energia e Comunidades. (2025, abril 10). *Encontro no Xingu discute acesso à energia em terras indígenas*. https://www.energiaecomunidades.com.br/2025/04/10/encontro-no-xingu-discute-acesso-a-energia-em-terras-indigenas/.

[56] Povos Xinguanos. (2025). *Carta dos povos Xinguanos sobre o Programa Luz para Todos*. https://www.energiaecomunidades.com.br/wp-content/uploads/2025/04/Carta_dos_povos_xinguanos_sobre_o_LpT.pdf

absence of free, prior, and informed consultation, the installation of low-capacity systems that fail to meet basic needs, and the lack of maintenance and technical support. The letter demands an urgent reconfiguration of the program to respect Indigenous rights and ensure energy solutions that are adequate, sustainable, and culturally appropriate.

The second document, the "C*ontribuição da Rede Energia e Comunidades ao encontro de monitoramento do Programa Luz para Todos no Xingu*" (Contribution from the Energy and Communities Network to the Monitoring Meeting on the Light for All Program in the Xingu) presents a technical and policy analysis from civil society organizations that are members of the network.[57] It offers concrete recommendations to improve the *Light for All* program in Indigenous areas, including the adoption of higher-capacity renewable systems, participatory planning, and long-term community-based training and support. Together, these declarations call for a shift from tokenistic infrastructure delivery to genuine energy justice and self-determination for Indigenous peoples in Brazil.

The experience of the Xingu community demonstrates that *Light for All*, rather than acting as a tool for empowerment, has in practice reinforced historical patterns of exclusion, risk, and disrespect. Electricity, implemented without genuine engagement or cultural sensitivity, became another form of institutional violence. Access to energy must not be reduced to a mere metric of coverage; it must be qualitatively adequate, culturally respectful, and built through the active participation of Indigenous peoples, affirming their rights to autonomy, dignity, and self-determination.

4. Third-Sector Initiative for Energy in Indigenous Lands: The Case of Xingu Solar

The Xingu Indigenous Territory is home to 16 distinct ethnic groups, with a population exceeding 6,000 individuals, living across more than 2.6 million hectares.[58] However, it represents only a fraction of Brazil's broader Indigenous landscape, which

[57] Rede Energia e Comunidades. (2025). *Contribuição da Rede Energia e Comunidades ao encontro de monitoramento do Programa Luz para Todos no Xingu*. https://www.energiaecomunidades.com.br/wp-content/uploads/2025/04/Contribuicao_da_Rede_Energia_e_Comunidades_ao_encontro_de_monitoramento_do_Programa_Luz_para_Todos_no_Xingu.pdf.

[58] Terras Indígenas do Brasil (s.d.). *Parque Indígena Xingu*. Retrieved April 16, 2025, from https://terrasindigenas.org.br/pt-br/terras-indigenas/3908.

comprises more than 570 territories covering nearly 120 million hectares.[59] Seeking to address the energy needs in Xingu while simultaneously reducing their reliance on fossil fuels, the non-governmental organization ISA launched the *Xingu Solar* project.[60] The initiative was guided by four key objectives: (1) to serve as a model for implementing renewable energy systems as a means of expanding access to electricity; (2) to provide technical training for local representatives, thereby increasing community autonomy and reducing the risk of electricity-related accidents; (3) to support the development of local strategies for managing and utilizing energy resources; and (4) to identify gaps in existing public policies and advocate for new frameworks that are better aligned with the realities of Indigenous territories.[61]

In pursuit of these objectives, as of 2023, ISA had installed 115 photovoltaic systems in 98 communities in the Xingu Indigenous Territory to generate solar electricity.[62] It is important to note that, at least in its initial phase, the project was not designed to fully meet the total energy demands of these communities. The initiative installed photovoltaic solar panels of small scale and placed in community spaces, such as schools, meeting centers, and medical stations.[63] As a result, while reliance on diesel or gasoline generators has decreased, these fossil fuel-based systems continue to operate alongside the photovoltaic installations.[64]

Nevertheless, by increasing clean energy availability and reducing the need for fuel supply, the *Xingu Solar* project led to multiple positive impacts in the communities,

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[59] Ministério dos Povos Indígenas. (2024, agosto 5). *Marco temporal volta à pauta no STF: Entenda por que a tese é inconstitucional e viola os direitos dos povos indígenas*. Fundação Nacional dos Povos Indígenas (FUNAI). https://www.gov.br/funai/pt-br/assuntos/noticias/2024/marco-temporal-volta-a-pauta-no-stf-entenda-porque-a-tese-e-inconstitucional-e-viola-os-direitos-dos-povos-indigenas.

[60] Instituto de Energia e Meio Ambiente (2019, March). *Xingu Solar:* Como a energia renovável pode beneficiar o Território Indígena do Xingu. Retrieved April 16, 2025, from https://energiaeambiente.org.br/wp-content/uploads/2019/01/relatorio_xingusolar_1.pdf.

[61] Instituto de Energia e Meio Ambiente (2019, March). *Xingu Solar:* Como a energia renovável pode beneficiar o Território Indígena do Xingu. Retrieved April 16, 2025, from https://energiaeambiente.org.br/wp-content/uploads/2019/01/relatorio_xingusolar_1.pdf.

[62] Netto, V. (2024, April 24). Energia solar amplia acesso à saúde de povos indígenas do Xingu. *Climate Tracker*. Retrieved May 2, 2025, from https://climatetrackerlatam.org/historias/energia-solar-amplia-acesso-a-saude-e-a-comunicacao-de-povos-indigenas-do-xingu/

[63] Instituto de Energia e Meio Ambiente (2019, March). *Aprendizados e desafios da inserção de tecnologia solar fotovoltaica no Território Indígena do Xingu*. Retrieved April 16, 2025, from https://energiaeambiente.org.br/wp-content/uploads/2019/01/xingusolar_avaliacaosocioambiental.pdf.

[64] Instituto de Energia e Meio Ambiente (2019, March). *Avaliação de impacto socioambiental da introdução de sistemas fotovoltaicos no Território Indígena do Xingu*. Retrieved April 16, 2025, from https://energiaeambiente.org.br/wp-content/uploads/2019/01/xingusolar_avaliacaosocioambiental.pdf.

as documented in a study conducted by the "*Instituto de Energia e Meio Ambiente – IEMA*" (Energy and Environment Institute).[65] This study reveals that in medical stations, the installation of solar panels increased the sense of security regarding potential emergency medical care by 32%. Moreover, there was an 18% increase in the availability of night school in communities benefiting from this initiative. Overall, 96% of the population in communities with solar energy in the Xingu Indigenous Territory expressed a preference for this source over diesel or gasoline generators. Beyond its socio-environmental benefits, the IEMA study also estimated that substituting diesel with solar energy saves the federal government thousands of dollars in subsidies.

Accordingly, *Xingu Solar's* innovative approach explores pathways for energy delivery that are aligned with local realities and employ sustainable technologies suited to the region's environmental conditions. It holds significant potential to inspire the development of other just energy transition initiatives in Indigenous territories—fostering inclusive development through universal access to electricity while respecting and incorporating the cultural practices and specific needs of local communities.

Thus, the initiatives *Xingu Solar* and *Light for All* represent two markedly different approaches to electrification in Indigenous territories such as the Xingu region. While both aim to address energy poverty, their conceptual foundations, implementation strategies, and sensitivity to Indigenous realities diverge significantly. *Xingu Solar*, coordinated by ISA in close collaboration with Indigenous communities, emphasizes decentralized, community-led energy solutions. The program focuses on installing small-scale photovoltaic systems in collective-use structures such as schools, health centers, and community spaces. Crucially, it invests in training Indigenous technicians to independently install, operate, and maintain these systems—thereby fostering technical autonomy and reducing dependence on external service providers. This model not only enhances the sustainability of the infrastructure but also respects Indigenous social structures and reinforces community governance over energy resources. However, it also faces limitations, particularly related to scalability and sustainability. As a non-governmental initiative, Xingu Solar depends on continuous financial resources and

[65] Instituto de Energia e Meio Ambiente (2019, March). *Avaliação de impacto socioambiental da introdução de sistemas fotovoltaicos no Território Indígena do Xingu.* Retrieved April 16, 2025, from https://energiaeambiente.org.br/wp-content/uploads/2019/01/xingusolar_avaliacaosocioambiental.pdf.

institutional support, which can be uncertain. Furthermore, its capacity to reach remote areas across a vast country like Brazil is limited, leaving the initiative geographically concentrated.

In contrast, *Light for All* represents a centralized, state-driven policy implemented in collaboration with energy concessionaires to promote universal electrification nationwide. Despite its broad scope and institutional backing, the program has encountered persistent challenges—particularly in Indigenous territories—related to technical inadequacy, lack of cultural sensitivity, and community approval. As this research highlights, many of these shortcomings remain insufficiently addressed by public authorities or energy concessionaires, raising critical questions about the program's capacity to deliver equitable and culturally appropriate energy access in historically marginalized regions.

5. Comparing the Government-Led and Third-Sector Models of Energy Transition in Indigenous Communities through the Lens of CLS

The experiences of the government-led *Light for All* program and the third-sector initiative *Xingu Solar* reveal fundamentally different approaches to expanding renewable energy access in Indigenous territories. Through the lens of CLS, these models highlight how institutional structures, legal frameworks, and asymmetries of power shape the outcomes of energy policy—often reinforcing, rather than redressing, long-standing inequalities.

The original design of *Light for All*, launched in 2003, prioritized rapid electrification by focusing on areas already accessible to Brazil's national electricity grid. While this strategy enabled millions of new connections, it simultaneously marginalized remote Indigenous territories by privileging logistical efficiency over equity. In its revised 2023 phase, the program formally highlights Indigenous communities into its priorities, signaling a discursive shift toward inclusion. However, as more Indigenous communities have been integrated into *Light for All*, the shortcomings of its implementation strategy have become more pronounced. The program continues to rely on top-down solutions that frequently overlook the cultural specificities and governance structures of Indigenous

peoples—often in violation of Brazilian regulations regarding consultation and Indigenous rights, as well as consumer regulations.

Reports from third-sector organizations, along with a recent formal letter issued by communities in the Xingu Territory, as referenced above, illustrate how these design flaws manifest in practice. Such failures are not simply oversights. They are emblematic of deeper legal and institutional logics that CLS scholars identify as perpetuating hierarchies under the guise of neutrality and universality. Instruments that appear objective, such as billing systems or service contracts, can entrench exclusion when imposed without recognition of linguistic, territorial, and legal pluralism.

From a technical standpoint, the *Light for All* program has faced persistent challenges in extending centralized infrastructure to remote areas, particularly Indigenous territories. Even when infrastructure is eventually installed, communities frequently experience ongoing maintenance failures, compromising the long-term reliability and continuity of energy access. Culturally, the planning and implementation of *Light for All* projects often exclude meaningful Indigenous participation, reinforcing top-down, paternalistic approaches that fail to respect communities' aspirations for energy sovereignty and self-determination. Institutionally, *Light for All* has also been associated with serious shortcomings, including the execution of unsafe installations that place communities at risk. Economically, limited transparency and inadequate communication mechanisms have further disadvantaged Indigenous communities. Many remain unaware of benefits and subsidies available to reduce electricity costs and lack access to effective channels for engaging with concessionaires, leaving them vulnerable to financial hardship. These challenges, when viewed through the lens of CLS, underscore how the *Light for All* program operates within legal and institutional structures that reproduce existing power hierarchies. Rather than serving as a neutral tool for universal access, the program reflects deeper systemic patterns of exclusion, paternalism, and regulatory neglect that disproportionately burden Indigenous communities and reinforce their marginalization within Brazil's energy governance framework.

Thus, while *Light for All* has been instrumental in reducing energy poverty at the national level, its standardized, top-down model has not adequately addressed the complex and context-specific needs of Indigenous territories. In contrast, *Xingu Solar*, coordinated by a non-governmental organization, adopts a participatory model rooted in

dialogue, local autonomy, and intercultural respect. The project focuses on installing photovoltaic systems in communal spaces while simultaneously training Indigenous technicians to operate and maintain the equipment. This approach aligns with CLS's emphasis on decentralizing legal authority and empowering marginalized communities to actively shape development processes. Its key distinction lies not only in the technical deployment of clean energy, but also in the recognition of Indigenous knowledge systems and the co-creation of energy governance practices. Nevertheless, *Xingu Solar* faces structural constraints. Like many third-sector initiatives, it depends on intermittent funding and lacks the regulatory scale and institutional permanence of state-led programs. Its operations are often limited to specific territories where long-term trust and engagement have been established, making broader replication challenging in a country as vast and diverse as Brazil.

What emerges as a potential pathway toward a just energy transition in Indigenous communities—particularly in the realm of electricity access—is the development of an integrative model that leverages the complementary strengths of both the state and civil society. The state brings the scale of infrastructure, legal authority, and regulatory oversight over energy concessionaires. In turn, third-sector actors—often networks of non-governmental organizations with strong local ties—offer deep contextual knowledge, culturally sensitive consultation practices, and social legitimacy within the communities they serve. However, as emphasized during the First Xingu Monitoring Meeting, effective collaboration between these sectors remains hindered by persistent asymmetries in power, access to information, institutional culture, linguistic differences, and bureaucratic constraints. Crucially, there is still no clear legal or procedural mechanism in place to meaningfully bridge these divides.

The contrast between *Light for All* and *Xingu Solar* illustrates that a truly just energy transition in Indigenous territories cannot depend exclusively on state efficiency or third-sector innovation. Instead, it demands pluralistic, hybrid arrangements that center Indigenous voices and account for cultural specificity. Only by confronting the legal and institutional biases embedded in existing energy governance structures can Brazil move

toward a transition that is not only technically sustainable, but also socially equitable and culturally emancipatory.

6. Conclusions

This paper has demonstrated that energy transition policies in Brazil's Indigenous territories are deeply shaped by institutional and legal structures that often reproduce, rather than redress, historical inequities. Despite the symbolic alignment of programs like *Light for All* with sustainable development goals, their top-down, standardized implementation strategies have failed to account for the cultural, territorial, and political specificities of Indigenous communities. As a result, state-led energy delivery has not only fallen short in expanding universal access but has also introduced new forms of institutional violence—manifested in unsafe installations, unclear billing practices, and the exclusion of Indigenous voices from planning and governance processes.

The analysis also reveals the limitations of third-sector alternatives, such as *Xingu Solar*. While this initiative offers a more participatory and context-sensitive model grounded in dialogue, technical autonomy, and local governance, it remains structurally constrained by its dependence on fragmented funding, limited scalability, and lack of institutional authority. Its successes are important but localized, highlighting the difficulty of advancing transformative energy solutions in a policy environment that privileges state control and market logic. Together, these perspectives reinforce the central premise of this study: that energy transition policies must be critically examined not only in terms of their technical and environmental dimensions, but also through the legal, institutional, and epistemological structures that determine who is heard, who decides, and who benefits.

This study also underscores a core contradiction in Brazil's energy landscape: Indigenous communities—globally recognized as environmental stewards—remain reliant on fossil fuels to meet basic needs. This paradox reveals more than a gap in infrastructure; it signals a broader failure to integrate justice, equity, and Indigenous agency into national energy policy. Addressing these contradictions will require not only

improved technical solutions but a fundamental reconfiguration of the legal and institutional frameworks that shape energy transitions.

By critically comparing state-led and third-sector energy transition models through the lens of CLS, this paper makes at least three contributions to the academic field. First, it advances the understanding of how legal and institutional frameworks in Brazil shape access to clean energy in ways that often perpetuate, rather than dismantle, structural inequalities—particularly in Indigenous territories. Second, it offers a grounded critique of the assumptions underlying both governmental and non-governmental interventions, highlighting how approaches fail to engage meaningfully with Indigenous autonomy, legal pluralism, and cultural specificity. Third, the study contributes to debates on decolonial energy governance and just transitions for advancing SDG 7 in structurally excluded contexts. While rooted in the Brazilian context, the analysis opens pathways for future research on just energy transitions in other marginalized communities worldwide.

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